VII. IMPRACTICAL EXCEPTION

Impractical Exception

Section VII

CPR 3/03

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A. Overview

Section VII, Purpose & Outline



- > Purpose: Evaluate a proposal that classifies a change impractical
- > Outline:
 - Review of rule 21.101(b)(3) and AC Figure 1
 - Overview of the process for impractical
 - Case Study of applicant's proposal
 - Step 6, determine resource costs
 - Step 7, make and document decision

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B. 21.101(b)(3): *Impractical*

21.101(b)(3): *Impractical*



- Impractical and does not contribute materially exceptions closely linked
- First establish that compliance with the latest regulations would contribute materially to product's level of safety, then examine practicality of applying those regulations

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 The processes used to apply these two exceptions share many common steps.

21.101(b)(3): *Impractical*, cont.



- ➤ As with *level of safety* exception, impractical applied on a regulation-byregulation basis using rule, CPR Order, and AC for guidance
 - Method in AC and taught here one way impractical may be applied; applicant may propose other acceptable methods

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21.101(b)(3): *Impractical*, cont.



- Unlike does not contribute materially exception, the impractical exception is applied on an amendment-byamendments basis
- If it is impractical to apply the latest amendment, applicant is expected to apply next amendment that is practical

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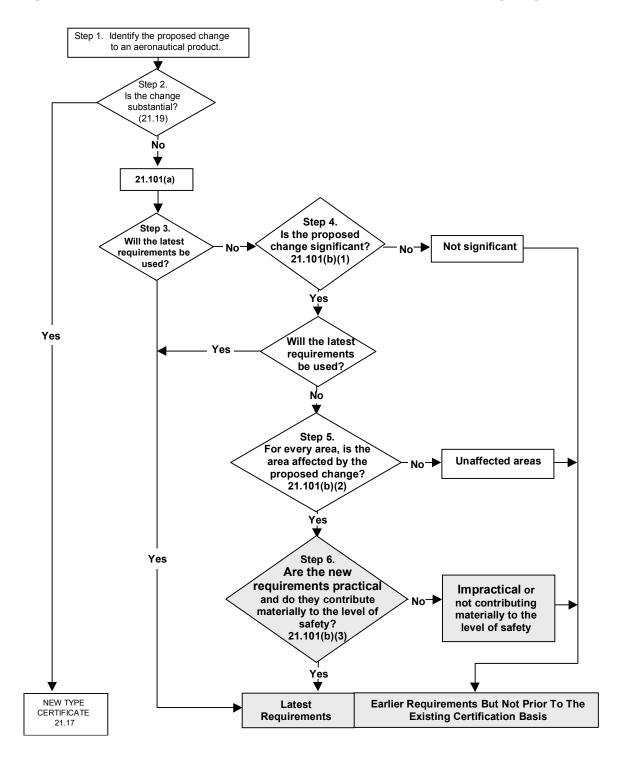
21.101(b)(3): *Impractical*, cont.



- > FAA expects fewer than 5% of all major changes will rise to level of significant
- > Of those, a small number will likely pursue impractical exception
- > ACO will not be making these decisions alone
 - Exceptions will be worked through issue paper process and have substantial Standards Staff involvement

- As you can see in Figure 1, shown on the next page, *impractical* is an extension of *does not contribute materially to the level of safety*, which is why they are put in the same diamond.
- An applicant has to progress through the steps of *level of safety* in order to formulate the argument for *impractical*. If complying with the latest amendment for a particular regulation **does not** materially contribute to the level of safety for a changed product, then the applicant may comply with an earlier regulation and there is no need to apply the *impractical* exception.
- However, if the latest amendment was found to contribute materially to the level of safety, then the applicant still has the option of proposing to use the *impractical* exception.

Figure 1 of AC 21.101-1 with 14 CFR 21.101(b)(3) Highlighted



21.101(b)(3): Impractical, cont.



➤ Each area, system, component, equipment, or appliance that is affected by the change, for which the Administrator finds that compliance with a regulation described in paragraph (a) of this section would not contribute materially to the level of safety of the changed product or would be impractical

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• This slide shows the exact wording of paragraph **21.101(b)(3)**, with would be impractical italicized for emphasis.

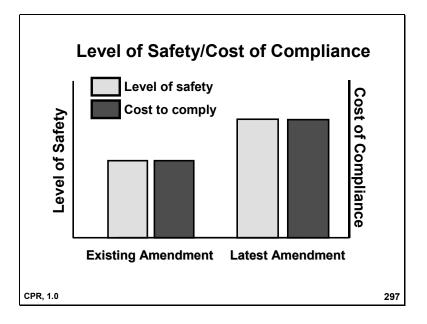
21.101(b)(3): Impractical, cont.



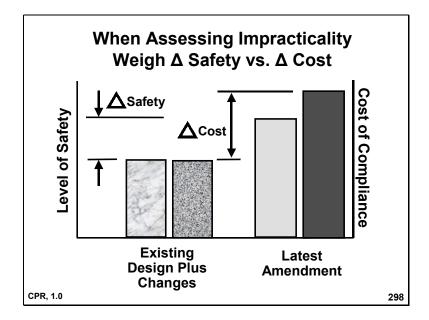
➤ Goal for *impractical* is to use the *most recent* amendment of a given regulation that is still *practical*

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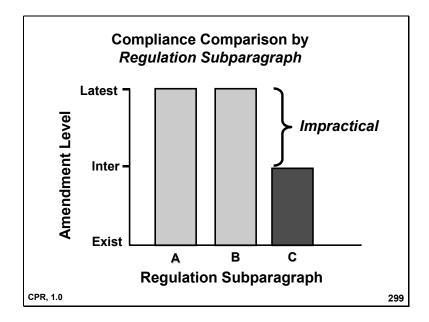
- Up to this point, we have focused on the **design change** (*significant*, *affected area*), the **changed product's level of safety**, and the **regulation's level of safety** (*does not contribute to the level of safety*).
- The *impractical* exception introduces a **new variable** to the discussion: **cost of compliance**.



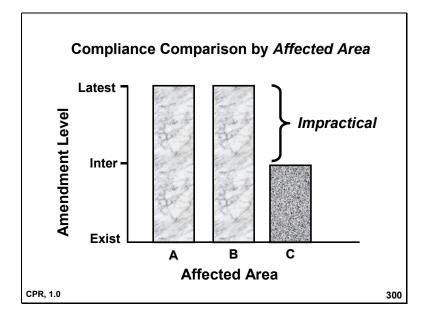
- This is a notional chart designed to demonstrate a balance between cost of compliance and level of safety. The light bars represent the level of safety, and the dark bars are the cost to comply with each amendment of the regulation.
 - These bars are the same height to illustrate a balance between safety and cost.
 - When each regulation or amendment was codified, a regulatory evaluation was made to ensure that application of the amendment was economically viable.



- However, the applicant for a significant change may have a unique situation where he proposes that the cost of compliance with the latest amendment might be out of balance with the safety achieved. This chart shows that:
 - The cost to have the proposed changed product comply with the latest amendment is out of balance with the safety benefit achieved.
 - There would be a safety benefit to comply with the latest amendment, and that compliance would materially contribute to the level of safety.
- It may be **practical** for the applicant to comply with almost all of the subparagraphs of a regulation, but **impractical** to comply with one specific subparagraph.



- On this slide, amendment level is on the vertical axis, while compliance with the existing certification basis is the baseline. Compliance with an intermediate and the latest amendment levels are also indicated.
- The graph shows that it would be **practical** for the change to comply with two subparagraphs of the regulation, but **impractical** to comply with subparagraph C. By this we mean there is an imbalance between the cost to comply and the safety benefit achieved.



• In this chart there are three areas of the changed product that are affected by a regulation. For two of the areas it is **practical** to comply with the latest amendment. However, for area C it is **impractical** for the proposed change to comply with the latest amendment and compliance with an earlier amendment is accepted.

Impractical Exception



- Applicant expected to comply with as much of regulation or as many areas as practical
- Parts of the regulation and/or areas where latest amendment is not complied with should be indicated on TCDS or STC
- Give applicant credit for latest amendments where compliance has been shown

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Impractical Exception, cont.



- Begin evaluation of an applicant's proposal of being impractical by determining whether compliance with latest amendment for that particular regulation would be impractical
- Continue on amendment-by-amendment basis down to existing certification level or the level where practical to comply

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Impractical Exception, cont.



- When original rule or amendment changes promulgated, an economic evaluation done to show that compliance was practical
- However, a specific changed product often has unique considerations applicant will use as the basis for proposal that compliance is impractical

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C. Overview of Process for Determining Impractical

- AC, Appendix 2, provides a generic procedure for determining when compliance with the latest regulations is impractical.
 - Some applicants may propose the use of this graphical procedure. However, the FAA found that it might not be appropriate for all products or situations. Any use of that graphical procedure would need to be coordinated with the appropriate Directorate Standards Staff.
- The seven steps for determining if applying a regulation at a particular amendment level contributes to the level of safety or is practical are:

Determining *Impractical* AC 21.101-1 (App. 2)



Applicant proposes & provides substantiation

- 1. Identify regulatory change being evaluated
- 2. Identify specific hazard regulation addresses
- 3. Review consequences of hazard(s)
- 4. Identify historical and predicted frequency of each consequence

Determining Impractical, cont.



Applicant proposes & provides substantiation

- 5. Determine how effective full compliance with latest amendment of the regulation would be at addressing hazard
- 6. Determine resource cost
- 7. Make and document decision regarding practicality

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D. Case Study Of Applicant's Proposal

The Case Study is summarized on the next page. This exception is applied on a rule-by-rule and amendment-by-amendment basis. As with the previous exception, we are looking at one regulation, §25.365, Pressurized compartment loads, to determine if it is impractical to comply with the latest amendment.

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Case Study – Transport Airplane Amended TC

Product Being Changed: Twin jet engine transport, existing certification basis at Amendment 25-41. Date of application: June 30, 2003, latest regulations at Amendment 25-109.

Description of Changes in the Application:

I. Lengthen Fuselage (same gross weight, trade payload for range) Determined to be Significant

Physical Changes	Functional Characteristics
 Add 10 ft. fuselage plug; total fuselage length is now 80 ft. Extend floor Add two row of seats Increase size of cargo compartment by 30% Add overhead bins Secondary Changes Lengthen control cable runs Extend services (O₂, plumbing, etc.) Increase local skin gauges at wing root 	 Performance Handling qualities External air loads Cabin safety (25.365, Pressurized compartment loads) Weight and balance

II. Increase Engine Thrust (takeoff on shorter runway) Determined to be Significant

Physical Changes	Functional Characteristics
 Increase engine thrust by 3% (9% previous increases without update of the certification basis) Redesign pylon to increase strength 	 Performance Flight characteristics Structural integrity
Secondary changes ➤ Change nacelle cooling flow	



- ➤ Applicant can meet latest amendment to 25.365 (25-71) in all except one area, the cockpit wall partition
- > Applicant's analysis indicated that
 - Partition would fail when subjected to pressure differential defined by regulation
 - Failure of partition would *not* have adverse impact on continued safe flight and landing

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Summary from Level of Safety, cont.



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- Partition in compliance with intermediate amendment to 25.365, amendment 25-54, which allows partition to fail as long as it does not compromise safe flight and landing
- FAA determined that compliance with amendment 25-71 would contribute materially to product's level of safety
- Applicant now proposes that compliance with 25-71 is impractical

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• The process and details of evaluating an applicant's proposal to determine impracticality are given in Appendix 2 of the AC.

E. Step 6: Determine Resource Costs

• In this step we compare the cost of complying with the latest regulation with the cost of complying with the regulation in the existing certification basis.

Step 6



- > Determine resource costs for applicant
 - Costs (incremental costs; debits)
 - ✓ Labor
- ✓ Subsequent operating
- ✓ Capital
- √ Revenue / utility loss
- √ Material
- Cost avoidance (credits)
 - ✓ Produce and maintain single version of a product that meets latest FAA and foreign CAA harmonized airworthiness standards

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Step 6, cont.



- > In a proposal, applicant may
 - Present economic/cost data, considering cost data presented in regulatory evaluation made in preamble to rule change
 - Look for inconsistencies between proposed design change and that in preamble in order to justify using impractical exception
- Costs may go up or down depending on technology changes as well as economic changes (labor and production)

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Practical ≠ Affordable



- Changes for a specific product deemed practical may still not be affordable for some STC applicants
- > Pursuing a change may not be economically viable for all applicants

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Practical ≠ **Affordable**, cont.



- > Coordinate issue papers with Standards Staff
- > Develop and maintain database of all *impractical* exceptions
- > Share this information with Continuous Improvement Team



Step 6, Case Study



> Determine resource costs

- Significant increase in labor and capital costs to comply with 25-71 instead of 25-41
- Negligible increase in costs related to materials, operating costs, and revenue utility loss

(Applicant's actual substantiation would include detailed accounts of these costs)

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F. **Step 7: Make and Document Decision Regarding Practicality**

Step 7



> Document conclusion

- Agree on effectiveness; is it practical to meet latest rule?
- Assess change in cost and safety benefit
- Expect applicant's change to include every practical measure towards complying with latest amendment



Step 7, Case Study



- > Make and document decision
 - Applicant's proposed design fully complies with 25-71, except for one interior partition
 - ✓ One interior partition would fail
 - √ Failure of partition has no impact on continued safe flight and landing
 - ✓ Design solutions for panel required additional costly changes

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Step 7, Case Study

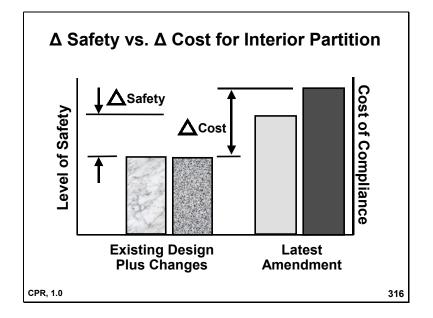


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Make and document decision

- With proposed design, applicant believes most of the safety benefits will be achieved
- Considering additional resources needed to fully comply, the applicant proposes it is impractical to comply fully with 25-71

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Step 7, Case Study, cont.



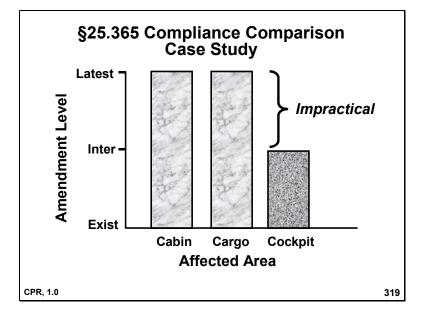
- > Make and document decision
 - Case reviewed by FAA ACO engineers, management, and Standards Staff
 - FAA agreed that
 - ✓ Large amount of resources needed to fully comply with the latest amendment
 - √ Costs not in balance with safety benefit

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- > Make and document decision
 - FAA found that applicant had substantiated its position that compliance to latest amendment would be impractical





Step 7, Case Study, cont.



- > Make and document decision
 - Applicant's proposal, substantiating data, and final FAA decision documented via G-1 issue paper
 - Certified design defined in drawing package
 - Changed product given credit for compliance to amendment 25-71 on the TCDS, with the exception of the cockpit wall that was given credit for compliance with amendment 25-54

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The CPR Order, Appendix 1-5, is an example for documenting exceptions on an STC.

G. Summary of Impractical Exception

Summary Questions



How does impractical differ from not contribute materially to the level of safety?

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Summary Questions, cont.

How would FAA engineer respond to applicant who says, "Given our small size and limited resources, it is impractical for us to comply with latest amendment level of a regulation for a proposed design change"?

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Summary Questions, cont.



- > In reviewing amendment levels for a particular rule, what is focus of review?
- What is meant by considering only incremental costs?

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Section VII Summary



- Applicant justifies that compliance with latest amendment would result in additional resource requirements not commensurate with gain in safety benefit
- > 7 step process in Appendix 2 of AC
- > Regulation-by-regulation basis
- > Amendment-by-amendment basis, starting with latest

Section VII Summary, cont.



- Goal of impractical is to use most recent amendment that is practical
- Impractical used when compliance would contribute materially to level of safety
- Compliance expected for subparagraphs and areas where practical

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Section VII Summary, cont.



- > Safety benefit
 - Examine hazard and intent of rule using sources such as NPRM, Final Rule, Preamble, AC
 - Examine accident and incident data to understand occurrences and consequences of hazard
 - Establish effectiveness of proposed design in complying with latest amendment

Section VII Summary, cont.



- > Cost
 - Consider only incremental cost
 - Consistent with past data
 - Practical does not equal affordable

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